

MANISTIQUE HARBOR, MICHIGAN.

L E T T E R

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS
OF EXAMINATION AND SURVEY OF MANISTIQUE HARBOR,
MICHIGAN.

JANUARY 18, 1904.—Referred to the Committee on Rivers and Harbors and ordered
to be printed, with accompanying illustration.

WAR DEPARTMENT,
Washington, January 14, 1904.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated January 13 instant, together with copies of reports dated July 30, 1902, and September 24, 1903, and reports supplementary thereto, from Maj. J. G. Warren, Corps of Engineers, of a preliminary examination and survey, respectively, of Manistique Harbor, Michigan, made by him in compliance with the provisions of the river and harbor act of June 13, 1902.

Very respectfully,

ELIHU ROOT,
Secretary of War.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 13, 1904.

SIR: I have the honor to submit herewith reports, dated July 30, 1902, and September 24, 1903, and reports supplementary thereto, by

Maj. J. G. Warren, Corps of Engineers, on preliminary examination and survey, respectively, of Manistique Harbor, Michigan, made pursuant to a requirement in the river and harbor act approved June 13, 1902. The sum of \$6,000 has been appropriated by Congress for the improvement of this locality, the expenditures thereunder having been applied to dredging, the existing structures having been built by private parties. Major Warren reports the harbor to be worthy of improvement by the General Government, which opinion is concurred in by the division engineer, Lieut. Col. O. H. Ernst, Corps of Engineers, and a plan for improvement contemplating the formation of an entrance channel and turning basin having a depth of 19 feet below datum, to be accomplished by pier construction and dredging, at an estimated cost of \$492,000, has been prepared by the district officer.

These reports have been reviewed by the Board of Engineers for Rivers and Harbors, under the provisions of sections 3 and 14 of the above-mentioned act, the harbor and vicinity have been personally inspected by a committee of the Board, and for reasons stated in its report of October 29, 1903, the Board considers that the expenditure of so large a sum as contemplated by the above-stated project is not warranted. Consideration has been given to certain modifications of this plan, and pursuant to the recommendations of the Board the accompanying supplemental estimates for such modified projects have been prepared by the district officer. A modified plan has been decided upon, and the Board expresses the opinion, in which I concur, that it is desirable that the improvement of Manistique Harbor, Michigan, be undertaken at a total estimated cost of \$270,000, in accordance with such plan, which includes only the following items of work recommended by the district officer in his report of September 24, 1903, on survey of the locality:

(a) On the east side of the harbor mouth, the pier connecting the shore with the old breakwater; the renewal of the superstructure of the latter with concrete, and its extension westwardly to the point of beginning of the proposed lake arm, marked A on map of the survey.

(b) On the west side of the harbor mouth, the construction of so much of the proposed pier as lies between the existing west pier and the 17-foot contour of the lake, at the point B.

(c) The dredging proposed, except over the area lying inside the present 17-foot contour on the west side of the entrance.

This omits from the work proposed by the district officer the extension of the piers beyond the points marked A and B on the map accompanying the survey, and the portion of the dredging over the area bounded by the 17-foot contour from the point B to a point near the extremity of the old slab dock on the western side of the entrance.

The estimates submitted do not include the acquisition of land and existing structures required in connection with the proposed work, as such property should, in the opinion of the district officer, be transferred to the United States without expense before the improvement is commenced.

Very respectfully, your obedient servant,

G. L. GILLESPIE,
Brig. Gen., Chief of Engineers, U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF MANISTIQUE HARBOR, MICHIGAN.

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., July 30, 1902.

GENERAL: I have the honor to submit the following report upon a preliminary examination made at Manistique Harbor, Michigan, in compliance with instructions contained in letter from Office of the Chief of Engineers, United States Army, dated June 23, 1902, and to comply with an item in section 14, of act approved June 13, 1902, and which reads as follows: "Manistique Harbor."

The harbor of Manistique is situated on the north shore of Lake Michigan and at the mouth of the Manistique River. The original depth at the mouth of the river was 8 feet. The Chicago Lumbering Company constructed two parallel slab piers, each about 1,600 feet long and 350 feet apart, and dredged a channel between them to a depth of 11 feet before any appropriation had been made by the Government.

In May, 1873, a detailed survey of and report on this harbor was made under the direction of Maj. D. C. Houston, Corps of Engineers, U. S. Army. (See Report of Chief of Engineers, 1873, p. 254.) The estimated cost of the proposed improvement was \$290,000, and the conclusion derived from the survey was, "there are no facts tending to show that the general commerce of the country will be benefited by the improvement of this harbor."

In November, 1879, another examination was made of this harbor and report submitted under date of December 20, 1879 (see Report of Chief of Engineers, 1880, p. 1931), in which a small amount of dredging to be done by the United States was recommended.

The original project for the improvement of this harbor was adopted in 1880, and provided for dredging a channel between the piers already constructed by private parties, the channel to be 150 feet wide and 13 feet deep below the present datum, i. e., 3.06 feet below high water of 1838, or 581.28 feet above mean sea level, at an estimated cost of \$6,000. For the purpose of carrying out this project, appropriations were made as follows:

Act of—

June 14, 1880	\$5,000
March 3, 1881	1,000
Total	6,000

No other appropriations have ever been made for the improvement of this harbor by the United States.

In October, 1880, a survey of the harbor showed that the direction of the piers lay across the natural channel, and directly toward a reef having only about 10 feet of water over it. The company which had built the piers, and had also the contract for dredging, found it necessary at this time to renew about 330 feet of the west pier which had been washed away. The superintendent of the company was notified by the officer in charge, Maj. H. M. Robert, Corps of Engineers, U. S. Army, that the direction of the piers would have to be changed. The company declined to comply with this demand, and their contract was annulled.

Since then there has been no dredging done at this harbor by the

United States, and the harbor was dropped from the list of duties of the officer in charge of this district by authority of the Chief of Engineers, in letter dated January 2, 1896, and final report made in monthly report for February, 1896, at which time there was an unexpended balance of \$2,044.95.

Since the suspension of operations by the United States, the Chicago Lumbering Company and other parties interested have maintained a channel of sufficient depth for their business by dredging, and have built a breakwater on the reef before mentioned, lying nearly opposite the present harbor entrance.

The correspondence relating to the change in direction of the piers, and subsequent annulment of contract and suspension of work by the United States, is published in Reports, Chief of Engineers, 1881, page 2055 et seq., and 1882, page 2118.

Since the Reports of 1873 and 1879, and the suspension of operations by the United States, there have been developments that have greatly increased the commercial importance of this harbor. While the Chicago Lumbering Company and associated companies continue to be the largest shippers, other important industries have been located at Manistique, among which are the Manistique Iron Company, having at the present time an output of about 40,000 tons per annum, the Burrell Chemical Company, and the White Marble Lime Company.

In addition to these industries, and of far more importance to the general commerce of the country, is the establishment of a car-ferry line between Manistique and Frankfort, Mich., by the Ann Arbor Railroad Company, which forms a new transportation line between the east and west. Manistique is the southern terminus of the Manistique, Marquette and Northern Railroad, which extends northward, connecting with the Duluth, South Shore and Atlantic Railway at Shingleton, Mich. It is also a station on the Minneapolis, St. Paul and Sault Ste. Marie Railway, thereby obtaining direct rail communication with St. Paul, Minneapolis, and the Northwest.

It is reported that another car-ferry line, between Manistique and Northport, Mich., on Grand Traverse Bay, will be opened in the near future.

The harbor of Manistique is seldom or never icebound to such an extent as to prevent the operation of car ferries. The Ann Arbor Railroad Company have operated their ferry to Manistique for three winters without serious trouble from ice, and it is the only harbor to which their ferry lines extend north of Kewaunee, Wis., that is open during the entire year. The only complaints made are of insufficient depth of channel.

The commercial statistics for Manistique for the calendar year ending December 31, 1901, as furnished by Mr. E. W. Miller, deputy collector of customs, are as follows:

Arrivals and departures of vessels.

	Entered.	Cleared.	Tonnage.
Steam	86	85	27,950
Sail	144	144	35,490
Total	230	229	63,440

Principal exports.

Lumber.....	feet B. M..	82,464,000
Lath, pickets, and shingles.....	pieces..	29,407,000
Pig iron.....	tons..	9,562

Principal imports.

Coal.....	tons..	2,600
Grain.....	bushels..	18,116

The foregoing statistics are incomplete, for the reason that vessels clearing from and to other ports, and calling in at Manistique en route, are not required to report at the custom-house.

The nearest harbor to the westward of Manistique is Escanaba, Mich., distant by water about 66 miles; the nearest harbor to the eastward is St. Ignace, Mich., distant by water about 75 miles.

There has been no survey made nor soundings taken at this harbor since May, 1892, and there have been material changes since then, so that the maps now available do not correctly show its present condition.

The commerce of Manistique is of constantly growing importance, and it is believed that the general commerce of the United States would be benefited by the improvement of this harbor.

For the foregoing reasons, therefore, Manistique Harbor is considered worthy of improvement by the General Government, and a survey is recommended in order to determine the nature, extent, and estimated cost of such improvements as may be of benefit to general commerce and can properly be undertaken by the United States. The estimated cost of this survey is \$750.

Very respectfully, your obedient servant,

J. G. WARREN,
Major, Corps of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

OFFICE DIVISION ENGINEER, NORTHWEST DIVISION,
Chicago, Ill., July 31, 1902.

Respectfully forwarded to the Chief of Engineers.

I concur in the opinion and recommendations contained in the last paragraph of this letter.

O. H. ERNST,
Lieut. Col., Corps of Engineers,
Division Engineer, Northwest Division.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS, U. S. ARMY,
August 12, 1902.

Respectfully referred to the Board of Engineers for Rivers and Harbors, constituted by Special Orders, No. 24, Headquarters, Corps of Engineers, current series, for consideration and recommendation, as required by section 3 of the act of June 13, 1902.

By command of Brig. Gen. Gillespie:

A. MACKENZIE,
Colonel, Corps of Engineers.

[Third indorsement.]

OFFICE CHIEF OF ENGINEERS, U. S. ARMY,
October 16, 1902.

Respectfully returned to the Chief of Engineers.

The Board of Engineers for Rivers and Harbors, constituted by Special Orders, No. 24, Headquarters, Corps of Engineers, current series, under provisions of section 3 of the river and harbor act of June 13, 1902, has examined and reviewed the within report of Maj. J. G. Warren, Corps of Engineers, on a preliminary examination of Manistique Harbor, Michigan. This examination was ordered by the river and harbor act of June 13, 1902.

Major Warren considers the locality worthy of improvement, and recommends a survey to cost \$750. His views and recommendations are concurred in by the division engineer, Col. O. H. Ernst, Corps of Engineers.

It appears from the report that the entrance to this harbor lies between piers constructed by private parties, that the United States has expended \$6,000 in dredging between those piers, and that the piers are wrongly located with respect to the natural entrance channel. The company which had built them having declined to change the direction of its piers, no further dredging has been done by the United States.

The commerce of the harbor has increased greatly of late, local industries of importance having arisen and a car-ferry line having been established between Manistique and Frankfort.

The Board considers that the commercial importance of the harbor is sufficient to justify such improvement as can be made at a reasonable cost, and recommends that a survey with plan and estimate of cost of the proposed improvement be made by the district officer, and that funds be allotted for this purpose as requested by him.

A. MACKENZIE,
*Colonel, Corps of Engineers,
 Senior Member of Board.*

[Fourth indorsement.]

OFFICE CHIEF OF ENGINEERS, U. S. ARMY,
October 23, 1902.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Manistique Harbor, Michigan, authorized by the river and harbor act of June 13, 1902.

Inviting attention to the report of the Board of Engineers of Rivers and Harbors, in the preceding indorsement, I recommend that a survey of the locality be made as proposed.

G. L. GILLESPIE,
Brig. Gen., Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT,
October 25, 1902.

Approved as recommended by the Chief of Engineers.

E. ROOT,
Secretary of War.

[Sixth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 2, 1903.

Respectfully returned to the Board of Engineers for Rivers and Harbors with report of survey as recommended.

By command of Brig. Gen. Gillespie:

H. F. HODGES,
Major, Corps of Engineers.

[Seventh indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., October 29, 1903.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The Board of Engineers for Rivers and Harbors has considered the accompanying report of the district officer, dated September 24, 1903, upon a survey and estimate of cost of improving Manistique Harbor, Michigan, and the indorsement of the division engineer thereon. On June 26, 1903, a committee of the Board made a personal inspection of the harbor and vicinity.

3. In third indorsement hereon the Board stated that it considers the commercial importance of this harbor sufficient to justify such improvement as can be made at a reasonable cost.

4. The estimated cost of the project proposed by the district officer is \$492,000, and there appears to the Board no technical objection to this plan. In the opinion of the Board, however, the present and reasonably prospective commerce of this port is not sufficient to warrant the expenditure by the United States of so large a sum. The importance of the harbor is, however, increasing, and the Board believes it to be worthy of improvement by the General Government to a limited extent.

5. The Board therefore recommends that the district officer be directed to modify his project and estimate of cost to include only the following:

(a) The construction of the east pier between its present end and the breakwater;

(b) The renewal of the superstructure of the breakwater with concrete;

(c) The extension of the breakwater toward the L marked in blue pencil "A" as far as deemed expedient, having in mind the omission of all pier construction proposed by the district officer on the west side of the harbor; and

(d) So much of the dredging proposed by the district officer as lies outside of the 17-foot contour on the west side of the harbor mouth.

It is estimated by the Board that the work suggested by it will materially improve the harbor at a cost of about \$150,000.

For the Board:

CHAS. J. ALLEN,
*Lieut. Col., Corps of Engineers,
Senior Member of the Board.*

[Eighth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 16, 1903.

Respectfully returned to Major Warren, inviting attention to the report of the Board of Engineers for Rivers and Harbors, in the preceding indorsement, and with request that he prepare and submit the modified project and estimate outlined by the Board in paragraph 5 of its report.

* * * * *

By order of the Acting Chief of Engineers:

H. F. HODGES,
Major, Corps of Engineers.

[Ninth indorsement.]

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., November 19, 1903.

Respectfully returned to the Chief of Engineers, United States Army, the necessary record having been made.

The estimate under the modified project, as called for in * * * the preceding indorsement, will be prepared and submitted at an early date.

J. G. WARREN,
Major, Corps of Engineers.

[Tenth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 28, 1903.

Respectfully returned to the Board of Engineers for Rivers and Harbors with modified plan and estimate as recommended.

By command of Brig. Gen. Gillespie:

H. F. HODGES,
Major, Corps of Engineers.

[Eleventh indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., December 5, 1903.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The Board has carefully reconsidered the project and estimate of the district officer, and the modified project suggested by the Board in seventh indorsement hereon.

3. After mature deliberation the Board remains of opinion that the sum proposed to be expended by the district officer—to wit, \$492,000—is in excess of the expenditure that seems advisable when compared with the prospective benefits to commerce. On the other hand, further study shows that the plan suggested in the seventh indorsement is faulty in providing no west pier to intercept sand, which, moved along the beach by westerly winds, would be held by the proposed east pier within the limits of the area proposed to be dredged.

4. In view of the facts heretofore recited, believing that the commerce involved will experience advantages commensurate with the cost, the Board is of opinion that a project should be adopted to include only the following items of work recommended by the district officer in his report of September 24, 1903, on the survey of Manistique Harbor, Michigan, viz:

(a) On the east side of the harbor mouth, the pier connecting the shore with the old breakwater; the renewal of the superstructure of the latter with concrete, and its extension westwardly to the point of beginning of the proposed lake arm, marked A on map of the survey.

(b) On the west side of the harbor mouth, the construction of so much of the proposed pier as lies between the shore and the 17-foot contour of the lake.

(c) The dredging proposed, except over the area lying inside the present 17-foot contour on the west side of the entrance.

5. It appears that the work above described will cost not to exceed \$250,000, but it is recommended that the district officer be requested to prepare a final estimate.

6. It is not believed that the cost of maintenance will exceed \$5,000 per annum.

For the Board:

A. M. MILLER,
Lieut. Col., Corps of Engineers,
Senior Member Present.

[Twelfth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 9, 1903.

Respectfully returned to Major Warren, requesting early return of this paper with the estimate referred to in paragraph 5 of the preceding indorsement.

By command of Brig. Gen. Gillespie.

W. V. JUDSON,
Captain, Corps of Engineers.

[Thirteenth indorsement.]

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., December 14, 1903.

Respectfully returned to the Chief of Engineers, United States Army, with the estimate inclosed as directed in the preceding indorsement.

J. G. WARREN,
Major, Corps of Engineers.

[Fourteenth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 21, 1903.

Respectfully returned to the Board of Engineers for Rivers and Harbors with final estimate as recommended.

By command of Brig. Gen. Gillespie.

H. F. HODGES,
Major, Corps of Engineers.

[Fifteenth indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., January 4, 1904.

Respectfully returned to the Chief of Engineers, United States Army.
The Board of Engineers for Rivers and Harbors has reviewed the accompanying estimate of cost of work proposed for the improvement of Manistique Harbor, Michigan, in accordance with the plan of the district officer, modified as recommended in eleventh indorsement on this paper.

It appears that the shore to which it is proposed to attach the west pier is unstable, and that to secure a safe anchorage the new pier should be carried back to the existing west pier.

Including the additional length of pier just referred to, the district officer estimates the total cost of the proposed work at \$270,000.

In view of all the facts bearing upon this subject, as expressed within, in the indorsements hereon, and in the reports accompanying, the Board recommends as desirable the improvement of Manistique Harbor, Michigan, at a total estimated cost of \$270,000, in accordance with the plan proposed in eleventh indorsement hereon, modified as to the length of the west pier, which should be started at the existing west pier.

For the Board:

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers,
Senior Member of the Board.

SURVEY OF MANISTIQUE HARBOR, MICHIGAN.

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., September 24, 1903.

GENERAL: I have the honor to submit the following report of a survey and an estimate of the cost of improvement of Manistique Harbor, Michigan, in accordance with the requirements of section 14, river and harbor act, approved June 13, 1902, together with a map of the survey.

The harbor of Manistique is situated on the north shore of Lake Michigan and at the mouth of the Manistique River. The nearest harbor to the westward is Escanaba, Mich., distant by water about 66 miles; the nearest harbor to the eastward is St. Ignace, Mich., distant by water about 75 miles. The Manistique River and its tributaries drain an area of over 1,400 square miles.

The original depth at the mouth of the river was 8 feet, which would be materially increased during periods of freshet. The Chicago Lumbering Company built two approximately parallel piers, and dredged a channel between them to a depth of 11 feet, before any appropriation for the improvement of this harbor had been made by the United States. The piers as originally built were each about 40 feet wide and 1,600 feet long, extending to the 14-foot contour, the distance between the piers being about 350 feet. These piers consisted of cribs made of round timber and filled with stone and edgings. They were located about 50 feet apart, and the intervals between cribs were filled with slabs and edgings. Since then, however, the shore line has made out nearly to the ends of the piers, and they have been

gradually built out into the channel, until at the present time the distance between piers at entrance is about 250 feet.

In May, 1873, a detailed survey of this harbor was made under the direction of Maj. D. C. Houston, Corps of Engineers, U. S. Army, and report submitted (see Report of Chief of Engineers, 1873, p. 254). The estimated cost of the proposed improvement was \$290,000, and the conclusion derived from the survey was, "there are no facts tending to show that the general commerce of the country will be benefited by the improvement of this harbor."

No further action looking toward the improvement of this harbor by the United States was taken until November, 1879, when an examination was made under the direction of Maj. Henry M. Robert, Corps of Engineers, U. S. Army, and report submitted under date of December 20, 1879 (see Report of Chief of Engineers, 1880, p. 1931), in which a small amount of dredging was recommended to be done by the United States.

The original project for the improvement of this harbor was adopted in 1880, and provided for dredging a channel between the piers built by the Chicago Lumbering Company, the channel to be 150 feet wide and 13 feet deep below the present datum plane, which is 581.28 feet above mean tide at New York City; the estimated cost of this improvement was \$6,000. For the purpose of carrying out this project, appropriations were made as follows:

Act of—	
June 14, 1880	\$5,000
March 3, 1881	1,000
Total	6,000

No other appropriations have ever been made for the improvement of this harbor by the United States.

In October, 1880, a survey of the harbor showed that the direction of the piers lay across the natural channel, and directly toward a reef having only about 10 feet of water over it. The Chicago Lumbering Company, which had the contract for dredging, found it necessary at this time to rebuild about 350 feet of the west pier, which had been washed away.

The officer in charge, Maj. Henry M. Robert, Corps of Engineers, U. S. Army, strongly advised the Chicago Lumbering Company to change the direction of the piers so as to conform with the natural channel, and stated at the same time that unless the direction of the piers was changed he should recommend that there be no further expenditures by the United States for the improvement of the harbor. The company declined to build the piers as recommended and their dredging contract was canceled.

Since then there has been no dredging done at this harbor by the United States, and the harbor was dropped from the list of duties of the officer in charge of this district, by authority of the Chief of Engineers, in letter dated January 2, 1896, and final report made in monthly report for February, 1896, at which time there was an unexpended balance of \$2,044.95.

The correspondence relating to the change in direction of the piers, and subsequent annulment of contract and suspension of work by the United States, is published in Report of Chief of Engineers, 1881, page 2055, et seq., and 1882, page 2118.

Since the reports of 1873 and 1879, and the suspension of operations by the United States, there have been developments that have greatly increased the commercial importance of this harbor. While the Chicago Lumbering Company and associated companies continue to be the largest shippers, other important industries have been located at Manistique, among which are the Manistique Iron Company, having at the present time an output of about 40,000 tons per annum; the Burrell Chemical Company, and the White Marble Lime Company.

In addition to these industries, and of far more importance to the general commerce of the country, is the establishment of a car-ferry line between Manistique and Frankfort, Mich., by the Ann Arbor Railroad Company, which forms a new transportation line between the east and west. It is also reported that within a short time another car-ferry line will be opened. Under date of September 11, 1903, Mr. Richard R. Metheany, president of the Manistique, Marquette and Northern Railroad Company, writes as follows:

This company will within two weeks put on a large car ferryboat to operate between Manistique and Northport, Mich., and it is expected that we shall make at least one round trip between those ports every day in the year.

The boat is about 400 feet long over all and draws under full cargo of cars about 14 feet forward and 15½ aft.

In addition to these car-ferry lines, the Goodrich Transportation Company and the Hart Line maintain regular lines of steamers, calling in at Manistique during the season of navigation, steamers of the first-named line calling weekly and those of the other line three or four times each week.

The harbor of Manistique is seldom or never icebound to such an extent as to prevent the operation of car ferries. The Ann Arbor Railroad Company have operated their ferry to Manistique for several winters without serious trouble from ice, and it is the only harbor to which their ferry lines extend, north of Keweenaw, Wis., that is open during the entire year. The only complaints made are of insufficient depth of channel.

Manistique is the southern terminus of the Manistique, Marquette and Northern Railroad, which extends northward, connecting with the Duluth, South Shore and Atlantic Railway at Shingleton, Mich. It is also a station on the Minneapolis, St. Paul and Sault Ste. Marie Railway, and is thereby in direct rail communication with St. Paul, Minneapolis, and the Northwest.

The commercial statistics for Manistique for the calendar year ending December 31, 1902, as furnished by Mr. E. W. Miller, deputy collector of customs, are as follows:

Arrivals and departures of vessels.

	Entered.	Cleared.
Steam	184	185
Sail	138	138
Total	322	323

Principal exports.

Lumber	feet B. M.	75,910,000
Lath, pickets, and shingles	pieces.	14,066,000
Pig iron	tons.	3,380
Cars of freight		2,718

Principal imports.

Coal.....	tons..	1,950
Cars of freight		2,303

The foregoing statistics are necessarily incomplete, for the reason that vessels clearing from and to other ports and calling in at Manistique are not required to report at the custom-house.

It will be noted from the foregoing statistics that the principal exports are lumber and other forest products and freight cars transported by the car ferries, and that the only imports of importance are cars of freight. Lumber and other forest products are usually carried in vessels of comparatively light draft; furthermore, the supply of standing timber tributary to Manistique is rapidly being reduced. The exports of lumber are becoming less each year, and it will be only a matter of a few years until they become unimportant.

But the ferrying of entire freight trains across the lake without breaking bulk is rapidly increasing in importance and will probably continue to increase with the building up of the Northwest, with which, as before stated, Manistique is in direct rail communication. It is not probable that there will be a very material increase in the local commerce of Manistique in the near future; but the general commerce passing through Manistique will probably become of more importance each year.

The harbor of Manistique has been treated by the Chicago Lumbering Company as private property, all the improvements, with the exception of the small amount of dredging done by the United States, having been made by them. In a letter to the Chief of Engineers, dated July 26, 1881 (see Report of Chief of Engineers, 1882, p. 2118), Maj. Henry M. Robert, Corps of Engineers, U. S. Army, says:

The discussion arising out of the break in the pier caused by the storm in October, 1880, in my opinion shows that the company desires to retain this as a close harbor and will do nothing which will give the public any further right therein.

In view of this, the following letter was sent to the Chicago Lumbering Company:

MILWAUKEE, WIS., *September 9, 1903.*

DEAR SIR: I am preparing a report on Manistique Harbor, Michigan, and desire therein to set forth all available information regarding the present and prospective commerce of this harbor. I shall therefore be pleased to receive from you at your early convenience such information relating to this subject as you can give.

It is understood that the slips which form the interior harbor of Manistique belong to you. It is desired to know whether any or all of them would be available for purposes of general commerce, and if so, when they would be available and for what draft of vessels.

Very respectfully,

J. G. WARREN,
Major, Corps of Engineers.

CHICAGO LUMBERING COMPANY,
Manistique, Mich.

No reply has been received to this letter, and it is not known whether or not the slips mentioned, and which are shown on map accompanying this report, would be available for purposes of general commerce.

As stated before, it is expected that within a short time another large car-ferry steamer will be calling in at Manistique, the maximum draft of this steamer being $15\frac{1}{2}$ feet. This will probably be the maximum draft required for some years to come. But as the car ferries have been and probably will continue to be operated during the winter

season, when the water is often from 2 to 2½ feet below datum, the depth in the entrance channel, to safely permit the car-ferry steamers to enter at any time, should be not less than 19 feet below datum. The act authorizing the survey specifies no definite depth to be obtained. In the estimate which follows a depth of 19 feet below datum plane, said plane being 581.28 feet above mean tide at New York City, is assumed as the depth to be obtained.

The survey developed the fact that solid rock underlies the outer harbor at variable depths, in some places being bare and in other places being covered with sand, sawdust, and clay. Numerous borings were taken where other materials overlies the rock, and the general surface of the rock obtained with sufficient accuracy to determine the location of the most economical and practicable channel.

On the map accompanying this report are shown the boundary lines of the proposed channel and the location of the piers necessary to protect the channel. The general location and direction of the proposed piers conform very closely to what was proposed by Maj. Henry M. Robert, Corps of Engineers, U. S. Army. (See map facing p. 2054, Report of Chief of Engineers, 1881.) The channel between these piers is practically the same as the one now used, and it can be deepened to 19 feet below datum without encountering solid rock.

The breakwater shown on map, about opposite the present harbor entrance, was built about seventeen years ago by the Chicago Lumbering Company, and consists of fourteen cribs each 26 feet wide and 30 feet long, filled with stone and decked. The superstructure, which extends to a height of about 8 feet above datum, is in fair condition, but will have to be renewed in the near future. It is then proposed to rebuild it with concrete. It is proposed to utilize this breakwater by connecting it with the end of the existing east pier, and also with the proposed new east pier, thus forming a basin, which would tend to still the water during storms, and also afford a turning basin.

The pier extensions are to consist of timber cribs, 20 and 24 feet wide, and provided with permanent concrete superstructures. The distance between piers at the outer end is to be 300 feet. Owing to the rock bottom, it will be impossible to drive foundation piles. The cribs are therefore to be placed on a foundation of stone, a trench being dredged to the solid rock before building this foundation. The east pier is to extend about 200 feet beyond the west pier, so as to protect the entrance from seas from a southeasterly direction. The west pier is to extend to the 19-foot contour. It will be necessary to remove about 650 feet from the outer end of the present west pier, and also to excavate a portion of the land belonging to the Manistique, Marquette and Northern Railroad Company and other parties, as is indicated on the map. The land required should be transferred to the United States without expense before the proposed improvement is commenced. The Chicago Lumbering Company should also release all claim it may have to the breakwater, in favor of the United States.

The proposed channel is to be 200 feet wide and 19 feet deep, and the basin is to be dredged to the same depth, so far as may be possible without encountering solid rock. The depth of 19 feet is to be carried between the present piers for a distance of 1,000 to 1,200 feet from their outer ends, at which distance solid rock is encountered at a depth less than 19 feet. The plan of improvement herewith submitted does

not contemplate any rock removal. But the piers are to be so built that, should it become necessary or desirable in the future to increase the depth to 21 feet, the additional depth can be obtained without having to rebuild them.

The material to be dredged is believed to be mostly sand mixed with sawdust. For many years it was the practice of the Chicago Lumbering Company to discharge the sawdust from their mills directly into the river. Much shoaling was caused thereby, as well as a rapid advance of the shore line. This practice, which was the subject of a correspondence between Maj. Henry M. Robert, Corps of Engineers, U. S. Army, and the officers of the company (see Report of Chief of Engineers, 1881, p. 2056), has now been discontinued, and at the present time the sawdust with other mill refuse is disposed of by burning.

The following is an estimate of the cost of obtaining a channel 19 feet deep below aforesaid-established datum plane, and is based upon existing prices of materials and labor. Concrete superstructures, extending from a plane 3 feet below datum to a plane 5 feet above datum, are provided for in all cases.

600 linear feet pier, 16 by 23 feet, at \$50	\$30,000	
400 linear feet pier, 20 by 22½ feet, at \$81	32,400	
1,300 linear feet pier, 24 by 22½ feet, at \$92	119,600	
22,550 tons stone, foundation and riprap, at \$1	22,550	
Total for west pier		\$204,550
300 linear feet pier, 20 by 14½ feet, at \$62	18,600	
200 linear feet pier, 20 by 16½ feet, at \$66	13,200	
200 linear feet pier, 20 by 20½ feet, at \$75	15,000	
100 linear feet pier, 24 by 15½ feet, at \$70	7,000	
250 linear feet pier, 24 by 17½ feet, at \$76	19,000	
300 linear feet pier, 24 by 18½ feet, at \$81	24,300	
200 linear feet pier, 24 by 22½ feet, at \$92	18,400	
400 linear feet pier, 24 by 24½ feet, at \$98	39,200	
15,550 tons stone, foundation and riprap, at \$1	15,550	
Total for east pier		170,250
420 linear feet concrete superstructure on breakwater, at \$65	27,300	
Removing 500 linear feet old west pier, at \$12	6,000	
260,000 cubic yards dredging, at 15 cents	39,000	
Contingencies, superintendence, etc	44,900	
Total		492,000

Should it become necessary to increase the depth to 21 feet below datum, each pier should be extended 200 feet, as shown on map by broken red lines, and the foregoing estimate would be increased by the following:

200 linear feet pier, 24 by 22½ feet, at \$92	\$18,400	
2,100 tons stone, foundation and riprap, at \$1	2,100	
Total for west pier		\$20,500
200 linear feet pier, 24 by 24½ feet, at \$98	19,600	
1,900 tons stone, foundation and riprap, at \$1	1,900	
Total for east pier		21,500
90,000 cubic yards dredging, at 15 cents	13,500	
11,000 cubic yards rock excavation, at \$5	55,000	
Contingencies, superintendence, etc	11,500	
Total		122,000

The total cost of obtaining a 21-foot harbor would then be \$614,000. This does not include a depth of 21 feet in the basin, to obtain which

it would be necessary to remove about 22,500 cubic yards of rock, additional, at an estimated cost, including contingencies, of \$123,750.

It is believed that the proposed depth of 19 feet is all that will be required at Manistique for many years to come, and subject to the conditions hereinbefore stated, that the necessary land shall be donated to the United States, and that all claims which the Chicago Lumbering Company may have to the breakwater shall be relinquished, the harbor of Manistique is considered worthy of improvement by the United States in the manner proposed.

Very respectfully, your obedient servant,

J. G. WARREN,
Major, Corps of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

OFFICE DIVISION ENGINEER, NORTHWEST DIVISION,
Chicago, Ill., September 29, 1903.

Respectfully forwarded to the Chief of Engineers.

I concur in the views and recommendations of Major Warren.

O. H. ERNST,
Colonel, Corps of Engineers,
Division Engineer, Northwest Division.

SUPPLEMENTARY REPORT ON SURVEY.

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., November 20, 1903.

GENERAL: In compliance with request contained in eighth indorsement, Office Chief of Engineers, November 16, 1903, I have the honor to submit the following estimate of the cost of modified project proposed by the Board of Engineers for Rivers and Harbors for the improvement of Manistique Harbor, Michigan, together with a blueprint^a showing in red the proposed modified project.

To prepare a new tracing would require the services of a draftsman for about ten days, at an estimated cost of \$40, and for which there is no money available. A blueprint of the original tracing accompanying the report of district officer dated September 24, 1903, is therefore submitted herewith, as the proposed modified project can be clearly shown thereon.

300 linear feet pier, 20 by 14½ feet, at \$67.50	\$20,250
200 linear feet pier, 20 by 16½ feet, at \$71.50	14,300
200 linear feet pier, 20 by 20½ feet, at \$81	16,200
Stone foundation and riprap for above, 7,000 tons, at \$1	7,000

Total for 700 linear feet pier, connecting end of east pier with easterly end of breakwater	57,750
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100 linear feet pier, 24 by 15½ feet, at \$78	7,800
250 linear feet pier, 24 by 17½ feet, at \$84.50	21,125
Stone foundation and riprap for above, 2,255 tons, at \$1	2,255

Total for 350 linear feet pier, in extension of present breakwater to point marked "A" on tracing	31,180
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^a Not printed.

The total estimated cost of extending the breakwater, by pier 24 by 17½ feet, is \$90.92 per linear foot.

The foregoing estimates for piers provide for timber-crib substructures resting on stone foundations, and having concrete superstructures, all as described in report of September 24, 1903.

The estimated cost per linear foot of pier construction is higher than in the estimate submitted in report of September 24, 1903, for the reason that it is believed the contract unit prices would be from 5 to 10 per cent higher for doing the less quantity of work, the original estimate having been made on the assumption that a contract would be let for the entire work as therein specified.

Estimate of cost of modified project.

700 linear feet pier, connecting end of east pier with easterly end of breakwater.....	\$57, 750
350 linear feet pier, in extension of breakwater to point marked "A" on map of harbor.....	31, 180
420 linear feet of concrete superstructure on present breakwater, at \$65 per linear foot.....	27, 300
150,000 cubic yards dredging to a depth of 19 feet below datum, within limits shown by broken red lines on blueprint herewith, at 15 cents.....	22, 500
Contingencies, superintendence, etc.....	13, 270
Total.....	152, 000

Very respectfully, your obedient servant,

J. G. WARREN,
Major, Corps of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.

ADDITIONAL SUPPLEMENTARY REPORT ON SURVEY.

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., December 14, 1903.

GENERAL: In compliance with request contained in twelfth indorsement, Office Chief of Engineers, December 9, 1903, I have the honor to submit the following estimate of modified project proposed by the Board of Engineers for Rivers and Harbors, for the improvement of Manistique Harbor, Michigan:

300 linear feet pier, 20 by 14½ feet, at \$67.50.....	\$20, 250
200 linear feet pier, 20 by 16½ feet, at \$71.50.....	14, 300
200 linear feet pier, 20 by 20½ feet, at \$81.....	16, 200
7,000 tons of stone for foundation and riprap for above, at \$1.....	7, 000

Total for 700 linear feet pier, connecting end of east pier with easterly end of breakwater.....	57, 750
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100 linear feet pier, 24 by 15½ feet, at \$78.....	7, 800
250 linear feet pier, 24 by 17½ feet, at \$84.50.....	21, 125
2,255 tons of stone for foundation and riprap for above, at \$1.....	2, 255

Total for 350 linear feet pier, in extension of present breakwater to point marked "A" on map of survey.....	31, 180
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600 linear feet pier, 20 by 22½ feet, at \$85.....	51, 000
7,250 tons of stone for foundation and riprap for above, at \$1.....	7, 250

Total for 600 linear feet of west pier, from present shore line to 17-foot contour.....	58, 250
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The foregoing estimates for piers provide for timber-crib substructures resting on stone foundations and having concrete superstructures, all as described in report of September 24, 1903.

The estimated cost per linear foot of pier construction, which is higher than in the estimate submitted in report of September 24, 1903, is taken at the same figures as stated in report of November 20, 1903, and for the reasons therein set forth.

Estimate of cost of modified project.

700 linear feet pier connecting end of east pier with easterly end of breakwater.....	\$57, 750
420 linear feet of concrete superstructure on present breakwater, at \$65 per linear foot	27, 300
350 linear feet pier, in extension of breakwater to point marked "A" on map of harbor	31, 180
600 linear feet pier, on west side of harbor, from present shore line to 17-foot contour.....	58, 250
160,000 cubic yards dredging to a depth of 19 feet below datum, over area lying outside of present 17-foot contour on west side of harbor, and dredging trench to rock for west pier, at 15 cents.....	24, 000
Contingencies, superintendence, etc.....	19, 520
Total	218, 000

The foregoing estimate is in accordance with the project laid down by the Board of Engineers for Rivers and Harbors, as per eleventh indorsement, December 5, 1903.

Attention is respectfully invited to the fact, probably unknown to the Board of Engineers for Rivers and Harbors, that under this project the west pier is not anchored at the inshore end, but begins directly at a beach which is known to be of very unstable and shifting material. During the progress of the survey the beach to the westward of the present harbor entrance was cut back at least 75 feet. The dotted line shown on map, about 150 feet back from the shore line, represents the line of what may be called fairly permanent beach. All that portion of the beach between the shore line and dotted line is composed of sawdust mixed with sand, and comes and goes with every storm.

It is therefore believed that if the west pier should be built from the shore line outward the first storm would leave it a detached work, by washing away the beach to the northward of it, and its purpose, at least to a considerable extent, would be defeated.

In view of the foregoing and for the information of the Chief of Engineers, I have prepared a second estimate, providing that the construction of west pier begin at the point originally proposed, as thereby it would be securely anchored to the existing west pier and be extended thence to 17-foot contour. If this were done, it would be necessary to dredge a trench to rock along the line of this pier through the beach, and the estimate provides for the dredging specified in report of September 24, 1903, except for dredging trench for west pier beyond the 17-foot contour.

The estimated cost of the west pier would be as follows:

600 linear feet pier, 16 by 23 feet, at \$53.....	\$31, 800
600 linear feet pier, 20 by 22½ feet, at \$85.....	51, 000
12,000 tons stone for foundation and riprap for above, at \$1	12, 000
Total for 1,200 linear feet of west pier.....	94, 800

The total estimate will then be as follows:

East pier and breakwater as before	\$116,230
1,200 linear feet west pier	94,800
230,000 cubic yards dredging, at 15 cents	34,500
Contingencies, superintendence, etc.	24,470

Total	270,000
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Very respectfully, your obedient servant,

J. G. WARREN,
Major, Corps of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.

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THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Subscription prices: Five dollars per annum in advance. Single copies, fifteen cents. Payment in advance. All communications should be addressed to the Editor, The Journal of the American Medical Association, 535 North Dearborn Street, Chicago, Ill., U.S.A.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

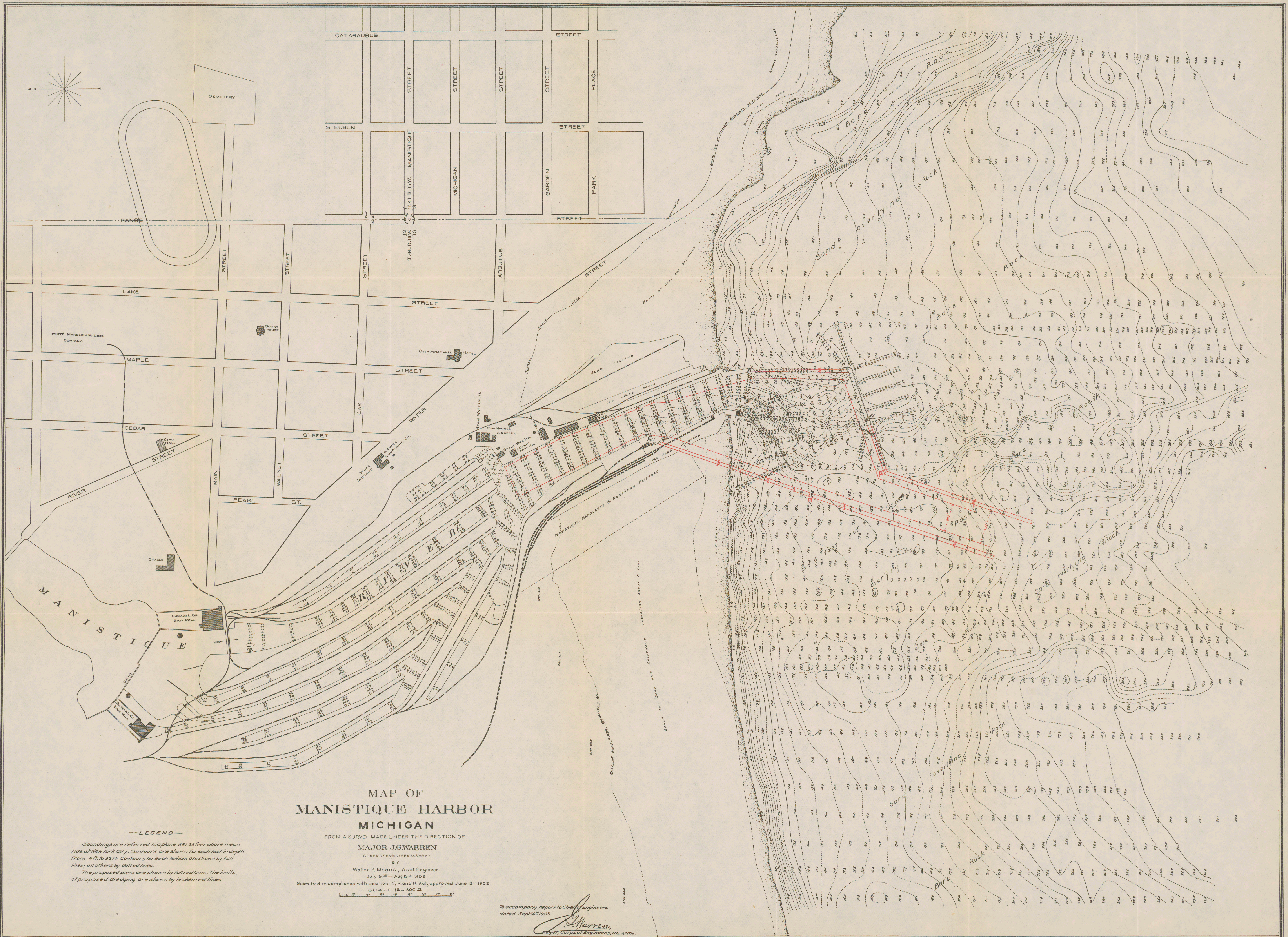
Vol. 11, No. 1

January 1, 1918

Published by the American Medical Association

535 North Dearborn Street, Chicago, Ill.

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MAP OF
MANISTIQUE HARBOR
MICHIGAN

FROM A SURVEY MADE UNDER THE DIRECTION OF

MAJOR J.G. WARREN

CORPS OF ENGINEERS U.S. ARMY

BY

Walter K. Means, Asst. Engineer

July 9th - Aug 10th 1903

Submitted in compliance with Section 14, R. and H. Act, approved June 13th 1902.

SCALE 1:50,000

—LEGEND—

Soundings are referred to plane 541.28 feet above mean
tide at New York City. Contours are shown for each foot in depth
from 4 ft. to 32 ft. Contours for each fathom are shown by full
lines; all others by dotted lines.
The proposed piers are shown by full red lines. The limits
of proposed dredging are shown by broken red lines.

To accompany report to Chief of Engineers
dated Sept 24th 1903.

J.G. Warren,
Major, Corps of Engineers, U.S. Army.